

**CLAIMS:**

1. A micro fluid biomolecule separation system comprising a primary separating path and one or more secondary process paths, said primary separating path being in the form of a separating coating carried on a substrate, wherein said separating coating comprising one or more separating layers, at least one separating layer consisting of or comprises one or more pH active components comprising pH active groups defined as chemical groups that are capable of being protonated or deprotonated in aqueous environments, said fluid biomolecule separation system comprises means for applying a voltage over the primary separating path, the or each secondary process path(s) comprising one or more inlets in liquid communication with the primary separating path, said one or more inlets being placed along or extends along the primary separating path, whereby biomolecules separated along the primary path is capable of being introduced into the secondary process path(s) for being processed further.

2. A micro fluid biomolecule separation system according to claim 1, wherein the separating coating of the primary separating path has a pH value which varies less than 1 pH unit, such as less than 0.5 pH unit or even less than 0.1 unit along the primary separating path, said separating coating preferably having a pH value which is essentially equal along the primary separating path.

3. A micro fluid biomolecule separation system according to claim 1, wherein the separating coating of the primary separating paths has a pH value which comprises a pH gradient along the primary separating path, said gradient being continuously or stepwise along the primary

separating path, said pH gradient preferably including a pH variation of up to about 8 pH values, more preferably between 0.1 and 5 pH units, such as between 0.5 and 3 units along the primary separating path.

5

4. A micro fluid biomolecule separation system according to any one of the preceding claims, further comprising a pair of electrodes, in the form of a positive electrode and a negative electrode in contact with or capable of  
10 being brought into contact with the separating coating at a distance from each other along the primary separating path.

5. A micro fluid biomolecule separation system  
15 according to any one of the preceding claims wherein the primary separating path comprises one, or more collection stations, preferably at least 3 collection stations, such as at least 4 collection stations, such as at least 5 collection stations, such as at least 7 collection  
20 stations, such as at least 10 collection stations.

6. A micro fluid biomolecule separation system according to claim 5, said one or more collection stations being in the form of a collecting unit  
25 comprising a collecting space e.g. in the form of a porous material, a collecting chamber or collecting cavity, said collection stations being in liquid communication with said one or more inlets for said secondary process path(s)

30

7. A micro fluid biomolecule separation system according to claim 5, said one or more collection stations being in the form of openings in or overflow edges of the primary separating path, said openings in or  
35 overflow edges preferably provides a liquid communication

with said one or more inlets for said secondary process path(s).

8. A micro fluid biomolecule separation system  
5 according to any one of the preceding claims wherein the primary separating path comprise 2 or more, such as 3, such as 4, such as 5, such as 7, such as 10 separating path sections along the separating path, said separating path sections differing from each other with respect to  
10 pH value, the difference in pH value of the separating coatings between two adjacent separating path sections preferably being in the interval between 0.05 and 4 pH unit, such as between 0.1 and 2 pH values, such as between 0.2 and 1 pH value-

15

9. A micro fluid biomolecule separation system according to claim 8 wherein each separating path sections comprise a section collection station.

20 10. A micro fluid biomolecule separation system according to any one of the preceding claims wherein the separating coating of the primary separation path comprising a pH gradient, said pH gradient being provided in the form of a pH active component linked to the substrate, the  
25 gradient preferably being constituted by a change of the number of pH active components.

11. A micro fluid biomolecule separation system according to any one of the preceding claims wherein the separation  
30 layer or layers include one or more pH active components, said pH active components being linked to the substrate optionally via one or more linker molecules and/or one or more layers of the separating coating, via a photochemically reactive group, such as a quinone.

35

12. A micro fluid biomolecule separation system according to any one of the preceding claims wherein the separating coating has a thickness of 1, 2, 5, 10 or 50 or even up to about 10,000 molecular layers of the molecules  
5 constituting the separating layer.

13. A micro fluid biomolecule separation system according to any one of the preceding claims wherein the separating coating has a thickness of between 0.01 and 15  $\mu\text{m}$ , such  
10 as between 0.5 and 10  $\mu\text{m}$ .

14. A micro fluid biomolecule separation system according to any one of the preceding claims wherein the primary separating path has a length of between 1 mm and 10 cm,  
15 such as between 5 and 50 mm.

15. A micro fluid biomolecule separation system according to any one of the preceding claims comprising one secondary path, said secondary path preferably being in  
20 the form of a gel, such as a gel selected from the group consisting of polyamide gels, such as a cross-linked polyacrylamide gel containing sodium dodecylsulfate (SDS), an ampholyte-containing cross-linked gel (IEF), agarose gel, cellulose gel and silica gel.

25

16. A micro fluid biomolecule separation system according to claim 15 wherein said primary path and said secondary path being perpendicular to each other, said secondary path preferably having a length between an top edge and a  
30 bottom edge and a width, said primary separating path preferably extends along the with of said secondary path, and being in contact with the bottom edge of said secondary path whereby said primary path and said secondary path being in liquid communication with each  
35 other.

17. A micro fluid biomolecule separation system according to claim 16 wherein said system further comprises means for applying a voltage over the secondary process path.

5

18. A micro fluid biomolecule separation system according to any one of the preceding claims 1-15 wherein said secondary path(s) being in the form of or contained in channels in a substrate.

10

19. A micro fluid biomolecule separation system according to any one of the preceding claims 1-15 wherein said system being in the form of a disc shaped device, comprising a microchannel structure said microchannel structure preferably includes said secondary process paths.

15

20. A micro fluid biomolecule separation system according to claim 19 wherein said disc shaped device preferably being essentially circular and comprises a centre, said microchannel structure being arranged around said centre.

20

21. A micro fluid biomolecule separation system according to any one of the claims 19-20 wherein said secondary process paths comprise one or more reaction chambers.

25

22. A micro fluid biomolecule separation system according to any one of the claims 19-21 wherein said secondary process paths comprise microchannels with walls having varying surface characteristics.

30

23. A micro fluid biomolecule separation system according to any one of the claims 19-22 wherein said secondary process paths comprise microchannels comprising a separating medium such as a gel.

35

24. A micro fluid biomolecule separation system according to any one of the claims 19-23 wherein said primary separating path being provided by a primary microchannel with a separating coating, said primary microchannel  
5 preferably being essential circular and extending around the centre of the disc shaped device.

25. A micro fluid biomolecule separation system according to claim 24 wherein said secondary process paths being  
10 extending from the primary path and towards the periphery of the disc shaped device.

26. A micro fluid biomolecule separation system according to any one of the claims 24-25 wherein said channel  
15 providing the primary separating path comprise 2 or more collection stations in the form of openings in the primary microchannel, which openings constitutes inlets to the secondary paths.

20 27. A micro fluid biomolecule separation system according to any one of the preceding claims wherein one or more of the secondary process paths being separating path or paths.